

Bridging the Gap: 3D Modeling to Hands on Learning

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This project is a rework of Cal Poly Construction Management Building Information Modeling class, Revit Activity. The goal of the assignment is to teach the fundamentals and concepts of Autodesk Revit, and the tools that can be used within the construction industry. The model itself is based upon a hands-on lab that the Commercial Construction class builds. The modeling exercise allows students to model several key elements of a building, following a construction sequence. Following the modeling, the students will be able to create sheets and create their own plan set that was modeled. On those plan sets they will be able to annotate the drawings with dimensions and descriptive text that a contractor would be able to build from, and in this exercise, plans they would be able to utilize in their Commercial class.

Key Words: Revit, Building Information Modeling, Education, Assignment, Organization

Background

This project is an assignment for a required course in the Construction Management curriculum at Cal Poly San Luis Obispo. This course CM 280, Building Information Modeling, focuses on teaching software to students that relate to the construction industry. Revit is a modeling software for building elements and document creation. The goal is to teach applicable skills using the software that can be used beyond institutional education. Along with the model being created, the students will then later actually build the structure that was modeled.

Content

The content of the lecture and assignment center around a hands-on model that Cal Poly Commercial Construction class constructs. There is an existing Simpson Strong Frame which is built to display commercial construction techniques and finishes. The following list goes over the systems covered in the construction of the building.

- Concrete Slab and Footings with Rebar
- CMU Walls
- Metal Stud Framing
- Dens Glass and Cement Board Sheathing
- Door and Window Placement
- Shoring System Erection

All these items that are listed are covered in the model being created in the assignment. There are aspects of the model that are created within Revit and subsequently edited to match desired properties. There is also an aspect of the assignment that requires students to access outside resources, such as

importing a model or models into their existing model. This part of the assignment mimics receiving a model from a subcontractor and having to place it into an existing model. In Figure 1 below the second-floor windows and the shoring system seen in the top right quadrant behind the studs are objects that are imported into the existing model. There is also a step by step lecture note document that details how to make all the elements and perform the steps to reach the final product. This is a document meant mainly for instructors of the course but can also be distributed to students. There is an extra credit portion of the assignment that encourages students to further their knowledge on their own time and learn advanced features that are not covered in the class lecture.



Figure 1: Final rendering of model within Revit

Reasoning

As the construction industry gets more and more advanced the workforce must advance with it. As the workforce progresses, colleges and university students must also progress. The goal of this lecture and assignment is to teach one of the most popular modeling software in the industry. At this point in time most of the models produced for architectural purposes are in Revit. Models for structural elements are slowly becoming more and more common in Revit. Giving students an early exposure to Revit allows them to experience the software firsthand and know the uses it provides. Along with the exposure to software, they are given the skills to fly through the model. Along with navigation, students can use tools effectively to manipulate the model and settings to gain information. In previous versions of the 3D modeling assignment it simply modeling elements and altering basic properties which did not

accurately show industry uses. This version of the assignment has elements that are used every day in industry.

Process

The process of figuring out what I wanted to do with this model was very interactive. I wanted to improve the lecture to better prepare students for post institutional life. Being in the same institution I had to find other ways about how to find out what I want to do. The goal is more easily understood by the list below:

- Informal conversation with industry professionals about skills needed upon graduation
- Personal research about modeling capabilities
- What was feasible to teach in a constrained time frame
- Personal knowledge

Going through many iterations of how to better improve the assignment and provide useful information I finally settled on the aforementioned project. It had all of the aspects of modeling that are widely being used by our industry and it is a good way to implement existing construction techniques and assemblies.

Future Improvements

The industry is always progressing in terms of technology and processes. As these do this assignment must do the same. The assignment must be updated every few years to mirror the industry standards. The goal of CM 280 is to teach current industry technologies, so as Revit becomes obsolete if it ever becomes an obsolete software this assignment will have to be phased out. This will be the responsibility of the future teachers of this class.